

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.  
PCT/EP2005/001223

**Re Item I.**

- 1 The amendments filed with the letter dated 14/12/2005 introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT. The amendments concerned are the following: the cancellation of elements of the disclaimer of claim 40 introduces subject-matter that is not to be found in the application as filed. Introduced claim 48 is not supported by the application as filed. Therefore the examination has been carried out on the basis of newly filed claims 1, 2 and 41-47 and 3-40 in their original version.

**Re Item V.**

- 1 Reference is made to the following document:  
D1 : DE 23 12 999 A (MOBIL OIL CORP) 27 September 1973 (1973-09-27)

**2 INDEPENDENT CLAIM 1**

- 2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT. Document D1 (see p.15 §2, ex. 15,16,18 and tab. 3) discloses a process of cracking hydrocarbons in the presence of hydrogen producing alkanes containing less than 6 carbon atoms, in contact with a catalytic composition comprising Zn on a Y-zeolite and rare earth oxide.
- 2.2 The argument developed by the applicant in his letter dated 14.12.2005 has been considered by the Examination Authority that came to the conclusion that hydrogen is present in the examples of D1 (See I.33 of tab.3 of D1). Moreover D1 cites the possibility of using the catalyst in a hydrocracking process. Therefore the inclusion of this feature in claim 1 does not render it new over document D1.

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**3 INDEPENDENT CLAIM 40**

- 3.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 40 is not new in the sense of Article 33(2) PCT. Document D1 (see ex. 15,16,18 and tab. 3) discloses a catalytic composition comprising Zn on a Y-zeolite and rare earth oxide.

**4 INDEPENDENT CLAIM 42**

- 4.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 42 is not new in the sense of Article 33(2) PCT. (see p.13 last § - p.14 §2; ex. 15,16,18 and tab. 3) discloses a process of preparation the catalytic composition according to claim 40, which comprises treating the zeolite with a compound of Zn by means of ion exchange, drying and calcining.

**5 INDEPENDENT CLAIM 45**

- 5.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 45 is not new in the sense of Article 33(2) PCT. Document D1 (see p.15 §2, ex. 15,16,18 and tab. 3) discloses a process of cracking hydrocarbons in the presence of hydrogen producing alkanes containing less than 6 carbon atoms, in contact with a catalytic composition comprising Zn on a Y-zeolite and rare earth oxide.

**6 INDEPENDENT CLAIM 46**

- 6.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 46 does not involve an inventive step in the sense of Article 33(3) PCT.

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- 6.2 Document D1 (see ex. 15,16,18 and tab. 3) is regarded as being the closest prior art. It discloses a catalytic composition comprising Zn on a Y-zeolite and rare earth oxide.
- 6.3 The subject-matter of claim 46 therefore differs from this known composition in that the composition further comprises a metal of group VIII.
- 6.4 The problem to be solved by the present invention may therefore be regarded as providing an alternative catalytical composition.
- 6.5 The solution proposed in claim 46 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) as the applicant did not demonstrate a technical effect of this feature.
- 7 DEPENDENT CLAIMS 2-39, 41, 43, 44 and 47  
Dependent claims 2-39, 41, 43, 44 and 47 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33(2) and (3) PCT).  
  
Claim 47 does not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not clearly defined. The claim attempt/s to define the subject-matter in terms of the result to be achieved, which merely amounts to a statement of the underlying problem, without providing the technical features necessary for achieving this result.

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CLAIMS

- 1) A process for the production of linear alkanes containing less than 6 carbon atoms which comprises putting a mixture comprising one or more hydrocarbons containing at least 6 carbon atoms, in presence of hydrogen, in contact with a catalytic composition comprising:
- a) at least one element Me selected from Zn, Mo, Cu, Ga, In, W, Ta, Zr, Ti, metals of group VIII Fe, Co, Ni, Ru, Rh, Pd, Os, Ir, Pt,
- 10 b) a zeolite selected from Y-zeolite and Y-zeolite modified by partial or total substitution of the Si with Ti or Ge and/or partial or total substitution of the aluminum with Fe, Ga or B,  
with the exclusion of a catalytic composition comprising at least one lanthanide, at least one metal belonging to group VIII and a zeolite selected from Y-zeolite and Y-zeolite modified by partial or total substitution of the Si with Ti or Ge and/or partial or total substitution of the aluminum with Fe, Ga or B when the mixture treated is a mixture containing aromatic compounds.
- 20 2) The process according to claim 1, wherein the mixture comprises one or more hydrocarbons containing at least 6 carbon atoms, selected from aromatic compounds, open-chain alkanes or alkanes with cyclic structures, alkenes having one or more unsaturations with open chains

In, W, Ta, Zr, Ti, metals of group VIII, Fe, Co, Ni, Ru,  
Rh, Pd, Os, Ir, Pt,

b) a zeolite selected from Y-zeolite and Y-zeolite modified by partial or total substitution of the Si with Ti  
5 or Ge and/or partial or total substitution of the aluminum with Fe, Ga or B,  
with the exclusion of a catalytic composition comprising at least one lanthanide, ~~at least one metal belonging to group VIII and a zeolite selected from Y-zeolite and Y-zeolite modified by partial or total substitution of the Si with Ti or Ge and/or partial or total substitution of the aluminum with Fe, Ga or B.~~  
10

41) The catalytic compositions according to claim 40, additionally containing one or more lanthanides.

15 42) A process for preparing the catalytic composition according to claim 40, which comprises treating the zeolite with a compound of the element Me by means of ion exchange or impregnation, drying and calcining.

20 43) A process for preparing the catalytic composition according to claim 41, which comprises treating the zeolite with a lanthanide compound, treating the product thus obtained with a compound of the element Me, drying and calcining.

25 44) The process according to claim 43, wherein the lanthanide is inserted in the zeolite in acidic form by

means of ion exchange, optionally calcining the product thus obtained, the element Me is then deposited by ion exchange, and the product obtained is dried and calcined.

45) A process for the production of linear alkanes containing less than ~~at least~~ 6 carbon atoms from mixtures containing aromatic compounds having a structure with at least 6 carbon atoms, in presence of hydrogen, using a catalytic composition consisting of:

10 a) at least one element Me selected from Zn, Mo, Cu, Ga, In, W, Ta, Zr, Ti, mixed with one or more metals of group VIII,

15 b) a zeolite selected from Y-zeolite and Y-zeolite modified by partial or total substitution of the Si with Ti or Ge and/or partial or total substitution of the aluminum with Fe, Ga or B,

c) one or more lanthanides.

46) A catalytic composition consisting of:

a) at least one element Me selected from Zn, Mo, Cu, Ga, In, W, Ta, Zr, Ti, mixed with one or more metals of group VIII,

b) a zeolite selected from Y-zeolite and Y-zeolite modified by partial or total substitution of the Si with Ti or Ge and/or partial or total substitution of the aluminum with Fe, Ga or B,

25 c) one or more lanthanides.

47. The process according to claim 33, wherein the resulting fraction of n-alkanes prevalently consists of ethane, propane and n-butane.

48. A process for the production of linear alkanes containing less than 6 carbon atoms which comprises putting a mixture comprising one or more hydrocarbons containing at least 6 carbon atoms, in contact with a catalytic composition comprising:

a) at least one element Me selected from Zn, Mo, Cu, Ga, 10 In, W, Ta, Zr, Ti, metals of group VIII Fe, Co, Ni, Ru, Rh, Pd, Os, Ir, Pt,

b) a zeolite selected from Y-zeolite and Y-zeolite modified by partial or total substitution of the Si with Ti or Ge and/or partial or total substitution of the aluminum with Fe, Ga or B,

with the exclusion of a catalytic composition comprising at least one lanthanide, at least one metal belonging to group VIII and a zeolite selected from Y-zeolite and Y-zeolite modified by partial or total substitution of the 20 Si with Ti or Ge and/or partial or total substitution of the aluminum with Fe, Ga or B when the mixture treated is a mixture containing aromatic compounds.